

## Fauna sumatrensis

Bijdrage No. 75, Ceratopogonidae (Diptera) †

by

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This report deals with a collection of Ceratopogonidae made by Mr. E. J a c o b s o n in Sumatra during the years 1925 and 1926 and presented by him to the British Museum. All the specimens were taken at Fort de Kock with the exception of two which were taken at Tandjunggadang, namely, one female *Forcipomyia* sp. (not named) and one female *Nilobezzia conspicua* Joh.

The collection consists of 95 specimens referable to 33 different species of which 14 appear to be new. Five others (not named) may also be new, but further materials are necessary for their determination. All the species belong to well known genera.

I have to thank Dr. F. W. E d w a r d s of the British Museum (Natural History), London, for the opportunity of examining the collection. Types are retained at the British Museum.

### *Forcipomyia* Mg.

*Forcipomyia ingrami* Cart.

SUMATRA : Fort de Kock, 920 M., 1925, 2 ♂♂, 3 ♀♀ (E. J a c o b s o n).

One of the two males is much darker brown than the other. In the paler coloured specimen the first tarsal segment is shorter than in West African specimens, the T. R. being about 0.6 instead of about 0.8. In both males the genitalia appear to be identical, and as in West African specimens. In West Africa the species is known to be variable.

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† Several of the species described in this Report were subsequently found in a collection of Ceratopogonidae from Malaya, or had to be referred to in the report on that collection. These species are *Forcipomyia grata*, *F. lanceolata*, *Atrichopogon edwardsi*, *A. harpagonum*, *A. vesiculosus*, *A. jejusus*, *A. assuetus*, *A. sumatrae*, *Culicoides sumatrae*, *Stilobezzia castanea*, and *Palpomyia caesia*. The Report on the Malayan collection has already been published (Annals of Tropical Medicine & Parasitology, XXVIII, pts. 2 and 3). In it the species referred to above were named, but they were only briefly described, or had their chief characters indicated merely by means of keys. The full descriptions of these species are contained in the present Report, and their types are these Sumatran specimens.

*Forcipomyia inornatipennis* (Aust.) var. *ornaticrus* I & M.

SUMATRA : Fort de Kock, 920 M., 1925 and 1926, 2 ♂♂, 3 ♀♀ (E. Jacobson).

The Sumatra specimens apparently do not differ in any respect from West African specimens. The species, which is known to be highly variable in West Africa, has probably received a number of different names in different parts of the world.

*Forcipomyia grata* sp. n.

A darkish brown species of medium size with wings adorned with numerous pale areas, and banded legs. T. R. 0.6 to 0.7. Densely clothed with striated scales.

♂, ♀ — Length of wing, 1.2 to 1.4 mm.; greatest breadth of wing about 0.4 mm.

Head dark brown. Palpi darkish brown: third segment about as long as fourth and fifth together, somewhat inflated, with small pit; fourth and fifth more or less fused. Antennae darkish brown. In male, plume large, dark brown at base,

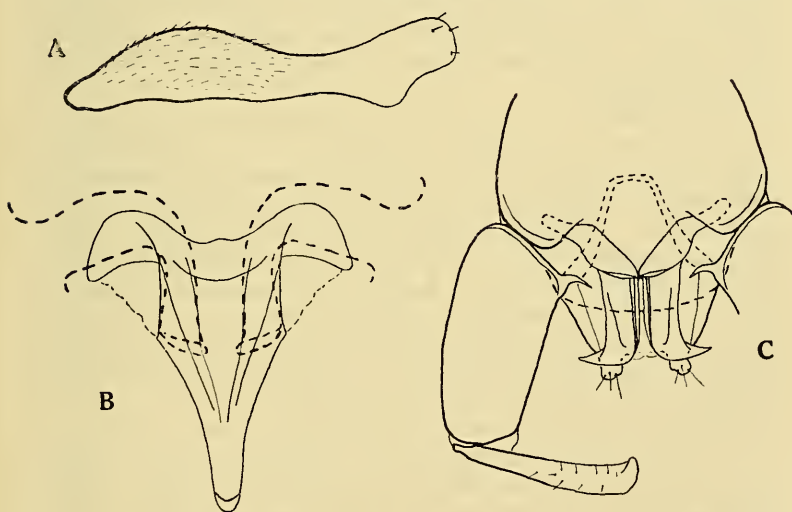


Fig. 1. *Forcipomyia grata* sp. n.: A.- clasper; B.- harpes and aedeagus, ventral view. *Lasiohelea stimulans* (de Meij.): C.- hypopygium, ventral view.

paler, yellowish at apex: segments 4—11 from sub-spherical to oval, measuring in one specimen from 15 by 13 to 17 by 9 units<sup>1</sup>; segments 12—15 elongate, in same specimen 46, 29, 24, and 31 (including stylet) units respectively. In female, segments 4—10 flask-shaped, with slender, sharply-

<sup>1</sup>) The unit used is about 3.7  $\mu$ .

pointed spines, measuring in one specimen from 16 by 8 to 16 by 7 units; segments 11—14 rather longer, sub-equal, in same specimen 20—21 units; last segment about 28 (with stylet) by 6 units. The combined lengths of segments 11—15, 4—10, and 3—10 in this specimen approximately 109, 112, and 129 units respectively.

*Thorax* dark brown, rather shaggy with dark, and some lighter brown bristles and scales. Scutellum dark brown.

*Wings* densely clothed with scales, and adorned with large pale spots the arrangement of which is of usual type, and corresponds in general with that found in the West African *F. squamipennis*, or the Chilean *F. multipicta*. The pale area in middle of anterior border is large, but does not cover any part of second radial cell. In female two pale spots can be distinguished between branches of Cu., the one in fork, and the other in angle formed by junction of Cu 1 with wing margin. In male pale areas much more extensive than in female, indeed almost whole wing appears to be pale with exception of radial areas, and a narrow, wavy, antero-posterior band at junction of middle and distal thirds. Venation as usual. Costa reaching a little beyond middle of wing. First radial cell almost obliterated; second well formed. Fork of Cu at about same level as end of costa. Halteres with pale, brownish knobs.

*Legs* banded, well clothed with bristles and scales. Femora of fore and middle legs mainly pale, yellowish, but each with a more or less distinct, narrow, sub-apical and sub-basal darker band; those of hind legs almost entirely dark brown. Tibiae of all legs with two dark bands, a narrow sub-basal, and a rather wider sub-apical. Last tarsal segment of all legs pale; fourth dark brown excepting at base; others dark brown in middle, with narrow pale zones on each side of joints. Knees, and all tarsal joints excepting last pale, yellowish. T.R. 0.6—0.7, rather less in male than in female. Claws and empodium normal.

*Abdomen* in female mainly dark brown, in male with more or less distinct paler, inter-segmental bands; densely clothed with scales as well as bristles. Spermathecae two, highly chitinised and dark brown, collapsed in the single female examined, but apparently sub-spherical and about 50—60 in diameter; the duct chitinised for only a short distance, about  $5\mu$ . Hypopygium (Fig. I, A and B.) mainly dark brown. Ninth segment dark brown, of usual shape, the distal extension of tergite somewhat chitinised at sides, the sternite hardly excavated in middle posteriorly. Side pieces dark brown at apices, paler, yellowish, at bases; densely clothed with very long bristles. Claspers yellowish, with blunt, shoe-shaped ends. Aedeagus moderately chitinised, conical, tapering distally. Harpes short and broad, apparently fused with

the dorsal portion of aedeagus. Membrane joining aedeagus to ninth sternite not spiculate.

SUMATRA : Fort de Kock, 920 M., 1925, 3 ♂♂, 5 ♀♀ „larvae living on Polyporus" (E. J a c o b s o n). With the adults are preserved several larval and pupal pelts.

This species resembles closely the African *F. squamipennis* I. & M., but the hypopygium of the male is quite distinctive.

*Forcipomyia lanceolata* sp. n.

A darkish brown species with wings adorned with a single pale, yellowish, area covering the second radial cell, and uniformly brown legs all the tibiae of which are armed with lanceolate spines. Without scales. T. R. about 0.7.

♀ — Length of wing, 1.6 mm.; greatest breadth of wing, about 0.6 mm.

*Head* darkish brown. Palpi rather dark brown, third segment much inflated at base. Antennae brown, the first three segments rather paler, yellowish. Segments 4—10 more or less flask-shaped, armed with rather stout spines not quite so long as the segments, measuring from 17 by 13 to 17 by 11 units; segments 11—14 cylindrical, sub-equal, about 19 by 8—9 units; the last segment larger, about 25 (with stylet) by 11 units. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 101, 119, and 139 units respectively.

*Thorax* darkish amber-brown, with traces of the usual adornment. Shoulder areas not pale. Scutellum darker than scutum, bearing numerous bristles and hairs.

*Wings* densely clothed with dark hairs, especially anteriorly, and adorned with a single small pale, yellowish, area which covers almost the whole of the second radial cell but does not extend beyond it towards the wing tip. Extreme base of wing also yellowish. Without scales. Costa extending to about middle of wing. First radial cell obliterated; second well formed, triangular. Fork of Cu slightly distal to level of end of costa. Halteres with pale, brownish knobs.

*Legs* almost uniformly brown, the basal segments perhaps a little paler than the others: without scales. All tibiae armed with numerous lanceolate spines which are not very broad, and taper to sharp points. T.R. about 0.7.

*Abdomen* dark brown, much darker than scutum, with its tip paler, yellowish: well clothed with dark bristles and hairs, but without scales. Spermathecae not examined.

SUMATRA : Fort de Kock, 920 M., 1926, 1 ♀ (E. J a c o b s o n).

This species may be distinguished from *F. mira* J o h a n n., an insect found in West Java which resembles it in having



the adornment of the wings somewhat similar, the T.R. about 0.8, and the tibiae armed with „lanceolate scales”, by the colour of the thorax which according to the description is bright yellow. It resembles in some respects also the South American *F. chilensis* (Philippi) which however is a much darker insect, and differs further in having the pale spot on the wing situated more distally, the lanceolate spines of the tibiae shorter and broader, and the tip of the abdomen dark brown, not yellowish.

*Forcipomyia* sp. a.

Sumatra : Tandjunggadang, 1000 M., 1925, 1 ♀, „larvae, carrying small drops of water on ends of hairs, live on Polypori” (E. J a c o b s o n). With the adult insect are preserved its larval and pupal pelts.

This is a very dark brown insect, bearing scales in addition to bristles and hairs, with T.R. about 0.6, with the wing adorned with a single rather large white spot about the middle of the anterior border, and dark brown legs with pale coloured knees and tarsal joints. It is probable that the species is a new one, but as there is only a single specimen in the collection, and that a female, the detailed description and determination must await the discovery of further material. The chief characters of the insect may, however, prove useful. They are as follows.

Length of wing, 1.3 mm. ; greatest breadth of wing about 0.5 mm. *Head* very dark brown. *Antennae* brown : segments 4—10 flask-shaped, measuring from 18 by 10 to 17 by 8 units, each armed with a pair of curved and pointed spines ; segments 11—14 sub-cylindrical, sub-equal, 17—19 by 7 units ; the last segment about 25 (with stylet) by 9 units. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 100, 125, and 143 units respectively. *Thorax* dark brown, well clothed with dark bristles, and bearing also pale-coloured, narrow, scales. *Scutellum* very dark brown. *Wings* dark, rather densely clothed with macrotrichia (some of which are almost scale-like) especially anteriorly, with the extreme base pale, and with a single, rather large, square, white area about the middle of the anterior border. The general appearance of the wing is similar to that of *F. edwardsi* I & M., but the white spot envelops the distal half of the first radial cell and the whole of the second. *Costa* extending a little beyond middle of wing. First radial cell obliterated, second well formed. Fork of Cu proximal to level of end of costa. Halteres with pale knobs and darker stems. *Legs* almost entirely dark brown, only the actual knees and tarsal joints pale coloured ; bearing narrow scales [as well as bristles and hairs] which are especially numerous on the femora and tibiae. T. R. about 0.6. *Abdomen* very dark brown.

*Lasiohelea* Kieff.*Lasiohelea pectinunguis* (de Meij.)SUMATRA: Fort de Kock, 920 M., 1925 and 1926,  
13 ♀♀ „sucking blood on Heterocera” (E. Jacobson).*Lasiohelea stimulans* (de Meij.)

The specimens referred to this species correspond fairly accurately with the description and figures of de Meijere (1909). They resemble closely the African *L. lefanui* (Carter), especially that variety of it which bears narrow scales on the legs, from which species they apparently differ only as indicated below.

♂ ♀ — Length of wing, male 1.5 mm., female 1.3 mm.; greatest breadth of wing, male 0.4 mm., female 0.5 mm.

*Head.* Eyes bare; broadly contiguous above in both sexes. Palpi with segment 5 slightly longer than 4, the two together not quite so long as 3; 3 only slightly inflated in middle, without a definite pit, with the short, club-shaped, sensory organs arranged in the male in a rather compact group on a slight depression about the middle, in the female more scattered, covering the middle two-thirds of the inner aspect. Mandibles and maxillae as in *L. lefanui*. Antennae of male dark brown, with well developed plume: segment 3 pedunculated, about 22 by 10 units; 4—11 sub-equal in length but gradually narrowing, from about 13 by 11 to 12 by 7 units; 11—15 elongate, in the specimen examined 32, 35, 30, and 37 (with stylet) by 6—7 units respectively. Antennae of female dark brown: segments 4—10 sub-spherical to oval, from about 8 by 9 to 11 by 7 units; 11—14 sub-cylindrical, sub-equal, about 26 by 6—7 units; the last segment about 35 (with stylet) by 7 units. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 140, 64, and 74 units respectively.

*Thorax.* Scutellum bearing in both sexes a transverse row of about 9 bristles, and a similar number of small hairs.

*Wings* with rounded tips, as in *L. lefanui*; in the male longer and narrower than in the female. Macrotrichia about as numerous as in *L. lefanui*, that is in female with two rows at base between M. and Cu.; and at level of fork of Cu. with 5—6 rows between Cu. and M., 4 between M 1 and M 2, and about 3 between M 1 and R 4 + 5. Along the veins are bare areas. Costa extending about two-thirds of the length of the wing. First radial cell obliterated; second long and very narrow, R 4 + 5 practically in contact with costa in middle, rather shorter in male than in female, Petiole of M about as long as cross-vein. Fork of Cu at about level of base of second radial cell. Halteres with whitish knobs.

*Legs* with narrow scales on the tarsal segments as well as bristles and hairs. T. R. in both sexes a little over 2.

*Abdomen* apparently devoid of scales. Spermatheca single,

somewhat pear-shaped, about  $92\mu$  by  $74\mu$ , well chitinated distally, but with the chitination gradually becoming feebler as the duct is approached. There is, however, no sharply defined line of separation between the highly chitinated part and the base as there is in *L. lefanui*. Hypopygium (Fig. 1., C.) of male very similar to that of *L. nigeriae*: the claspers are perhaps narrower at their bases, the aedeagus is shaped rather differently and has a broader basal arch, and there is a small spine at the inner angle of the base of the side-piece which is not shown in the figure of the hypopygium of *L. nigeriae*.

SUMATRA: Fort de Kock, 920 M., 1925, 2 ♂, 3 ♀♀ (E. Jacobson).

*Lasiohelea stimulans* appears therefore to be distinct from *L. lefanui*, and although it is clearly very closely allied to that species, and also to *L. nigeriae*, and *L. styliifer*, may be distinguished from any of them by one or more of the following characters — the long, very narrow second radial cell, the number of macrotrichia on the wing which is greater than in *L. nigeriae* but less than in *L. styliifer*, the palp without a sensory pit, and the shape of the spermatheca.

### *Atrichopogon* Kieff.

*Atrichopogon edwardsi* n. n.

SUMATRA: Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This species was first recorded from Ceylon, and differentiated from *A. jacobsoni* by Edwards (1913 and 1928), but was not named by him. It may therefore appropriately be dedicated to him. It bears a general resemblance to *A. jacobsoni*, but differs, as pointed out by Edwards, in having the last segment of all the tarsi conspicuously black, and the angle formed by the branches of Cu less than a right angle. Additional points of difference that may be mentioned are in the antennae and the T. R. The antennae are not so dark brown, segments 3—10 being pale brown at the base. Segments 4—10 are also longer, 10 being twice as long as broad and not sub-spherical as in *A. jacobsoni*. The T. R. is about 2.2 instead of about 2.8 as it is in the female *A. jacobsoni*.

*Atrichopogon harpagonum* sp. n.

A small, mainly yellowish-brown species, without macrotrichia, with banded legs, and with the abdomen of the female armed ventrally with a pair of strong hooks.

♀ — Length of wing 1.0—1.1 mm.; greatest breadth of wing 0.4—0.5 mm.;

Head brown. Eyes hairy in part; contiguous above. Palpi slender, very pale brown, the last two segments almost colour-

less : lengths of last three segments about 13, 9, and 12 units respectively ; third slightly inflated, with a rather small pit. Mandibles with darkened tips, armed with about ten small teeth. Antennae with last five and a half segments brown, rest pale, yellowish : segments 4—10 from sub-spherical to oval, 7 by 7 to 8 by 6 units ; 11—15 elongate, about 17, 20, 21, 21, and 29 (with stylet) by 7—8 units respectively. The combined lengths of segments 11—15, 4—10, and 3—10 in this specimen approximately 109, 54, and 65 units respectively.

*Thorax* brown or reddish-brown, with traces of usual scutal adornment. Scutellum about same colour as scutum ; bearing 4 yellowish-brown bristles, and a few (? 4) small hairs.

*Wings* unadorned, veins yellowish-brown. No macrotrichia. Costa extending about three-quarters length of wing. Radial cells very narrow, first slit-like, second rather more open, not unlike those of *Lasiohelea* : second about three times as long as first. Petiole of M as long as crossvein. Fork of Cu distal to that of M. End of Cu 1 distal to level of end of costa. Cu 2 oblique, angle formed by branches of Cu less than a right angle. Halteres with whitish knobs.

*Legs* yellowish-brown, with darker brown bands covering greater part of femora and tibiae, but leaving knees and apices of tibiae pale. T. R. about 2.8.

*Abdomen* darkish brown, but tip paler and containing a whitish substance ; bearing on the ventral surface a complicated genital armature, notably a pair of strong hooks (Fig. 2). Spermatheca single, highly chitinated, partly collapsed in the specimen, but probably oval and tapering towards the duct, about  $75\ \mu$  by  $60\ \mu$  ; the duct chitinated for only a short distance, about  $7\ \mu$ .

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This insect is clearly allied to *A. armativentris* (Kieff.) which bears a similar, but different genital armature. Kieffer first placed *A. armativentris* in the genus *Kempia*, but later included it in the genus *Gymnohelea*. The specimen described above is in most respects a typical *Atrichopogon*, so that it seems unnecessary to refer it to a special genus or sub-genus.

*Atrichopogon vesiculosus* sp. n.

A very dark brown species with paler brown legs, wings with a fair number of macrotrichia, and the basal segments of the antennae broader than long.

♀ — Length of wing, 1.4 mm ; greatest breadth of wing, about 0.5 mm.

*Head* very dark brown. Eyes hairy, contiguous above. Antennae dark brown : segments 4—10 from broader than

long to sub-spherical, measuring from 7 by 10 to 9 by 9 units; 11—15 elongate, about 21, 20, 21, 23, and (?) 32 (with stylet) by 7—8 units. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 117, 55, and 67 units respectively.

*Thorax* very dark brown, with faint indications of the usual scutal adornment. Scutellum paler brown than scutum; bearing 4 bristles and several (about 10) small hairs.

*Wings* with macrotrichia on apical quarter, and a very few in cubital and anal cells also. Costa extending about three-quarters length of wing. Second radial cell rather less than two and a half times as long as first. Petiole of M. about same length as cross-vein or a little less. Fork of Cu distal to that of M. Tip of Cu 1 at about same level as end of costa or slightly more distal. Cu 2 oblique. Halteres with whitish knobs.

*Legs* almost uniformly light brown, but terminal segments of tarsi a little more infuscated. T.R. about 2.5.

*Abdomen* very dark brown in dried insect. Spermatheca

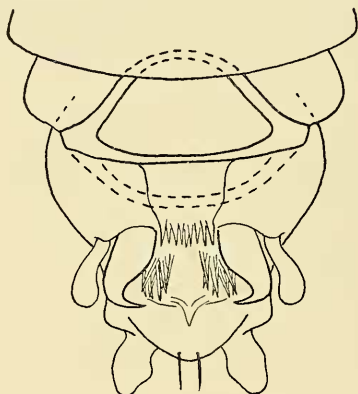


Fig. 2. *Atrichopogon harpagonum* sp.n.: ventral view of end of abdomen of female.

single, highly chitinised, pitted, but pits very small, oval but narrowed at each end, very large, nearly  $250\ \mu$  by  $150\ \mu$  the duct chitinised for only a short distance, about  $7\ \mu$

SUMATRA: Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

In Johannsen's (1931) list of species from the Malayan Subregion of the Dutch East Indies those that resemble this insect most closely are apparently *A. diluta* Joh. and *A. attentata* Joh., from both of which it may be distinguished (to mention only a single point) by having the Scutellum paler brown than the scutum.



*Atrichopogon jejunus* sp. n.

A small dark brown but not blackish species, with paler brown legs, and wings almost devoid of macrotrichia, the basal segments of the antennae broader than long, the petiole of M. shorter than the cross-vein, and T.R. about 3.

♀ — Length of wing, 1.3 mm.; greatest breadth of wing, 0.4 mm.

*Head* dark brown. Eyes hairy in part, broadly contiguous above. Palpi darkish brown: third segment slightly inflated about middle, with small, deep, pit; fourth and fifth subequal, together rather longer than third. Antennae darkish brown: segments 4—10 broader than long, from about 5 by 9 to 6 by 8 units; 11—15 elongate, in specimen measured about 21, 23, 25, 26, and 33 (with stylet) by 5—7 units respectively. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 128, 38, and 46 units respectively.

*Thorax* uniformly dark brown. Scutellum hardly paler than scutum; bearing 4 bristles, and about 4 small hairs.

*Wings* unadorned. Macrotrichia very scanty, a few (10) at tip in cell R 5, a row along distal half of vein M 1, and perhaps one or two at periphery in cell M 1; none in cubital and anal cells. Costa extending nearly three-quarters length of wing. Second radial cell about four times as long as first. Petiole of M about half length of cross-vein. Fork of Cu just distal to that of M. End of Cu 1 at wing margin a little proximal to level of end of costa. Cu 2 oblique. Halteres with whitish knobs.

*Legs* almost uniformly brown or yellowish-brown. T. R. about 3.

*Abdomen* darkish brown, not so dark as scutum. Spermatheca single, highly chitinated, oval but tapering towards duct, about  $63\ \mu$  by  $56\ \mu$ ; duct chitinated for a short distance. about 8

SUMATRA: Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

According to the key to the species found in the Malayan Subregion recently published by Johansen (1931) this insect would run down to *A. attenta* Joh. It differs, however, from that species, and also from the adjacent *A. diluta* Joh., in having fewer macrotrichia on the wings, and in having the segments 3—10 of antenna only a little more than one third the length of 11—15 combined. It also resembles in some respects the South American *A. albinensis* I & M, but is not so dark in colour, and has the second radial cell longer, and the ratio of the antennal segments 11—15 to 4—10 about 3:1 instead of about 2:1.

*Atrichopogon sumatrae* sp. n.

This species resembles the preceding one, *A. jejunos* sp. n., rather closely, but has the basal segments of the antenna longer than broad, oval.

♀ — Length of wing, 1.1—1.2 mm.; greatest breadth of wing, 0.3—0.4 mm.

*Head* very dark brown. Eyes hairy, contiguous above. Palpi darkish brown: third segment inflated in middle, with deep pit; fourth and fifth sub-equal in length, but fifth almost conical, together rather longer than third. Antennae uniformly dark or very dark brown: segments 4—10 oval, measuring in one specimen from about 9 by 7 to 10 by 6 units; segments 11—15 elongate, about 22, 22, 25, 25, and 35 (with stylet) by 5—6 units respectively. The combined lengths of segments 11—15, 4—10, and 3—10 in this specimen approximately 127, 70, and 82 units respectively.

*Thorax* uniformly very dark brown. Scutellum very dark brown, as dark as the scutum, in three of the specimens, but in one apparently not differing in other respects it is definitely paler, yellowish. Scutellum bearing four bristles and one or two small hairs.

*Wings* unadorned. Macrotrichia scanty, a few at tip in cells R 5 and M 1, and along the distal part of vein M 1 and sometimes M 2, rather variable in number, but none in cubital and anal cells. Costa extending about three-quarters of length of wing. Second radial cell about four times as long as first. Petiole of M shorter than cross-vein. Fork of Cu distal to that of M. End of Cu 1 at wing margin at or distal to level of end of costa. Cu 2 oblique. Halteres with whitish knobs.

*Legs* uniformly yellowish-brown. T. R. about 2.6.

*Abdomen* brown, not so dark as scutum, tip somewhat paler than rest. Spermatheca single, highly chitinised, oval, about  $75\ \mu$  by  $60\ \mu$ : duct rather wide, its commencement chitinised for a short distance, about  $5\ \mu$

SUMATRA: Fort de Kock, 920 M., 1925 and 1926, 4 ♀ ♀ (E. Jacobson).

*Atrichopogon assuetus* sp. n.

An almost black species, with numerous macrotrichia on the wings of the female, and yellowish-brown legs with the femora of the four posterior legs adorned with a broad, dark brown band. The chief characters of this insect are as follows.

♀ — Length of wing, 1.3 mm., greatest breadth of wing, 0.4 mm.

*Head, thorax, scutellum, and abdomen* (excepting tip) almost black. Antennae very dark brown excepting torus and third segment which are paler, yellowish: segments 4—10 sub-spherical, measuring from about 9 by 9 to 10 by 9 units;

11—15 elongate, about 28, 29, 31, 31, and 41 (with stylet) by 6—7 units. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 160, 67, and 80 units respectively. *Wings* bearing macrotrichia over practically whole surface with exception of radial areas and lines along the veins, those in cell R 5 extending nearly to cross-vein, and those between M and Cu reaching almost to base, being about five rows deep at level of cross-vein. Costa extending about three-quarters length of wing. Second radial cell over four times as long as first. Petiole of M about same length as cross-vein. Fork of Cu distal to that of M. End of Cu 1 at about same level as end of costa or slightly more proximal. Cu 2 oblique, the angle formed by the branches of Cu rather large but not so great as a right angle. Halteres with white knobs and dark brown stems. *Legs* yellowish-brown, with terminal segments of tarsi somewhat infuscated, and femora of middle and hind legs each adorned with broad dark-brown band which covers middle of segment. Femora of fore legs with very faint indications of bands. Tibiae without bands. T. R. about 2.9. *Abdomen* almost black excepting tip and cerci which are yellowish. Spermathecae not examined.

SUMATRA : Fort de Kock., 920 M., 1925, 1 ♀ (E. Jacobson).

This insect clearly resembles rather closely the New Zealand species, *A. shortlandi* M., but is smaller, and lacks the dark banding of the tibiae.

*Atrichopogon* sp. ♂.

An almost black species, with almost black scutellum, uniformly yellowish-brown legs, and halteres with dark brown knobs.

♂ — Length of wing, 2.0 mm. ; greatest breadth of wing, 0.5 mm.

*Head* almost black. Antenna with torus and third segment yellowish brown, other segments and plume dark brown ; segments 4—11 of usual form, measuring from about 19 by 15 to 16 by 10 units ; 12 more drawn out, 27 units ; 13—15 sub-cylindrical, about 69, 44, and 67 (with stylet) by 6 units respectively.

*Thorax* almost black, slightly paler at wing roots. Scutellum almost black.

*Wings* slightly smoky excepting at bases, and with veins rather dark especially those in the radial area in the middle third. No macrotrichia. Costa extending about three-quarters wing length. Second radial cell over four times as long as first. Petiole of M about same length as cross vein. Fork of Cu well distal to that of M. Cu 1 reaching wing margin at

about same level as end of costa. Cu 2 oblique. Halteres with dark brown knobs.

*Legs* uniformly yellowish-brown. T. R. about 2.4.

*Abdomen* almost black. Hypopygium not examined.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♂ (E. Jacobson).

This insect, which is rather larger than any of the females in the collection, probably belongs to a species not previously described, but no name is proposed for it because, in this genus, the chief characters for differentiating species are generally found in the females.

### *Culicoides* Latr.

*Culicoides anophelis* Edw.

SUMATRA : Fort de Kock, 920 M., 1925, 2 ♀♀ (E. Jacobson).

*Culicoides guttifer* (de Meij.)

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (damaged) (E. Jacobson).

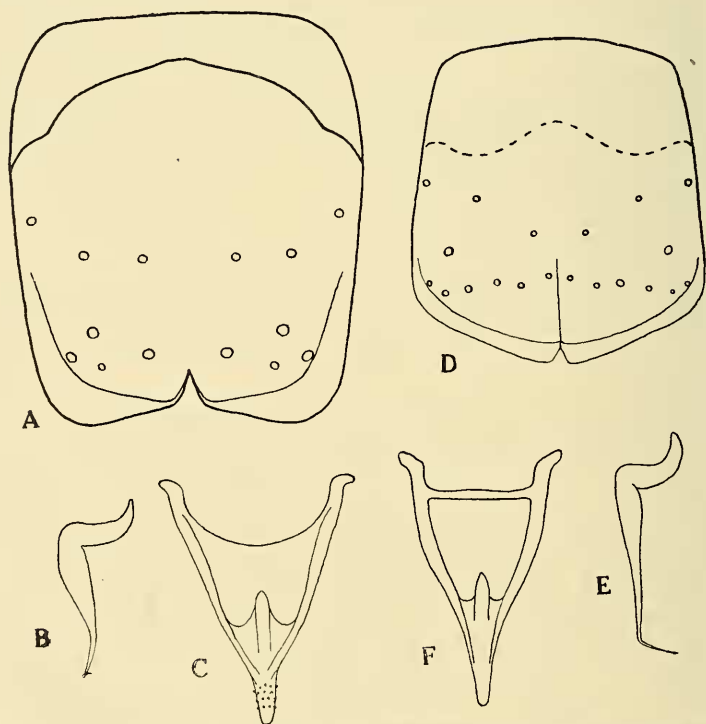


Fig. 3. *Culicoides jacobsoni* sp.n.: A.- ninth segment, ventral view; B.- harpe; C.- aedeagus. *Culicoides sumatrae* sp.n.: D.- ninth segment, dorsal view; E.- harpe; F.- aedeagus.

*Culicoides peregrinus* Kieff.

SUMATRA : Fort de Kock., 920 M., 1925, 1 ♀ (E. Jacobson).

*Culicoides jacobsoni*, sp. n.

A rather pale brown species, resembling *C. orientalis* M. in size and general characteristics, but differing as indicated below.

♂ — Antennae pale brown, yellowish. Thorax brown, with darker, broad markings on scutum. Wings pale, much paler than in *C. orientalis*, the numerous pale areas similarly arranged but rather indistinct, and the pale spot about the middle of the anterior border covering almost the whole of the second radial cell, in this respect (as also in the general pallor of the wing) resembling the African species, *C. pallidipennis* C. I. & M. Macrotrichia very scanty, a few at the periphery near the tip in cells R 5 and M 1 only. Radial cells about equal in length : first slit-like, second nearly square. Legs rather pale brown, knees dark, adornment otherwise as in *C. orientalis*. Abdomen rather pale brown. Hypopygium (Fig. 3., A., B., and C.) similar to that of *C. orientalis*. Posterior margin of ninth tergite rectangular, with a median cleft, without finger-like processes, but with rather large lateral hairy processes. Ninth sternite with excavation of moderate depth. Harpes and aedeagus similar, the latter, however, with numerous minute papillae on its distal portion just before its extremity. Membrane joining aedeagus to ninth sternite spiculate basally.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♂ (E. Jacobson).

This insect, of which there is in the collection only a single specimen, a male, clearly belongs to that group of species which includes the European *C. obsoletus* and *C. chiopterus*, the African *C. grahami* and *C. pallidipennis*, the American *C. sanguisugus*, the Indian *C. orientalis*, and their allies. From most of them it may be distinguished by the greater pallor of the wings, the scarcity of macrotrichia, and the broad second radial cell almost completely covered by a pale spot. From *C. chiopterus* and *C. pallidipennis* which resemble it in some of these characters, it may be distinguished by the details of the structures of the hypopygium, especially by the form of the posterior border of the ninth tergite, and the presence of minute papillae on the distal prolongation of the aedeagus.

*Culicoides sumatrae* sp. n.

A dark brown species resembling *C. peregrinus* Kieff., but differing as indicated below.



♂ — Antennae dark brown. Thorax dark brown; scutal adornment indistinct. Wings adorned with numerous pale spots and markings arranged as shown in Edwards' figure of the wing of *C. peregrinus* (Bulletin of Entomological Research, 1922, vol. XIII, pl. 3, fig. 1) but with a well defined rounded pale spot just above the fork of Cu., and without the pale area in the angle formed by the forking of this vein. Halteres pale, brownish. Legs rather dark brown, but all tibiae with a narrow basal band. Abdomen dark brown. Hypopygium (Fig. 3, D., E., and F.) dark brown at base, paler distally. Posterior margin of ninth tergite rectangular, with a median cleft, without finger-like processes. Harpes rather feebly chitinised, tapering distally to almost filiform ends. Aedeagus somewhat similar to that of *C. orientalis*. Membrane joining aedeagus to ninth sternite not spiculate.

SUMATRA: Fort de Kock, 920 M., 1925, 1 ♂, „aus Pilzen (Polyporus) gezüchtet" (E. Jacobson).

### *Dasyhelea* Kieff.

#### *Dasyhelea* sp.γ.

A dark brown, but not black, species, with scutellum rather paler brown, halteres dark brown, and legs pale brown.

♀ — Length of wing, 1.3 mm.; greatest breadth of wing, 0.5 mm.

*Head* dark brown. Eyes densely hairy; contiguous above. Palpi darkish brown, short, lengths of last three segments in one specimen 12, 9, and 13 units respectively; third without pit. Antennae dark brown: segments sculptured, 4—10 oval, sub-equal, about 11 by 10 units; 11—14 more flask-shaped, sub-equal, length 14—16 units; last segment longer, 31 units (with stylet). The combined lengths of segments 11—15, 4—10, and 3—10 approximately 94, 81, and 93 units respectively. Spatulate hairs present.

*Thorax* uniformly dark brown. Scutellum darkish brown, paler than scutum: bearing 6—8 bristles [4—6 centro-marginal and 2 lateral], but no small hairs.

*Wings* as usual; veins in radial areas dark, especially those forming second cell. Macrotrichia rather scanty; bare areas along veins well defined. Costa reaching to about middle of wing. First radial cell obliterated; second almost if not quite obliterated, much longer than broad. Petiole of M. about as long as cross-vein. Fork of Cu slightly proximal to level of end of costa. Halteres dark brown, but knobs do contain a pale-coloured substance which may show through cuticle.

*Legs* almost uniformly brown, but actual knee joints and last segment of each tarsus darker, dark brown. T. R. about 3.

*Abdomen* dark brown: tergites with pale dots at hair bases. M-shaped arrangement of chitinous bands round vulva,

but no hooks. Spermatheca single, oval, about  $89\ \mu$  by  $63\ \mu$ , the duct rather wide at base, arising obliquely.

SUMATRA : Fort de Kock, 920 M., 1925, 2 ♀ ♀ (E. Jacobson).

This insect approaches most nearly no *D. perfida* in Johansen's recent key to the species from the Malayan Subregion of the Dutch East Indies, but is much darker in colour, dark brown instead of yellowish. It is probably a new species, but as hitherto only females have been collected, and because the male is likely to furnish the most characteristic and conspicuous specific distinctions, no name is proposed for it at present. For the same reasons the species which follow are briefly described but not named.

*Dasyhelea* sp. ♂.

A very small, almost black species, with brown legs, and scutellum much paler than the scutum, and halteres with white knobs. The antennal segments form an almost continuous series, the 15th. without a definite stylet. T.R. about 2.2.

♀ — Length of wing, 0.8 mm. ; greatest breadth of wing, 0.3 mm.

*Head* almost black. Eyes densely hairy. Palpi brown ; third segment without pit. Antennae dark brown, the segments sculptured, narrowed anteriorly but not flask-shaped, forming an almost continuous series : segments 4—10 from 8 by 6 to 11 by 5 units, 11—14 from 12 by 5 to 14 by 5 units, 15 only slightly longer than 14 (18 units), without a definite stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 70, 70, and 78 units respectively. Spatulate hairs present.

*Thorax* almost black. Scutellum brown, much paler than scutum : bearing 5 bristles (2 lateral, 3 centro-marginal) but no small hairs.

*Wings* as usual. Costa reaching to about middle of wing. First radial cell obliterated ; second almost obliterated, longer than broad. Petiole of M. not so long as cross-vein. Fork of Cu at about same level as end of costa. Halteres with white knobs.

*Legs* brown, femora rather darker and first four segments of tarsi rather paler than rest. T. R. about 2.2.

*Abdomen* almost black. Spermatheca single, highly chitinated, pyriform, about  $55\ \mu$  by  $37\ \mu$ .

SUMATRA : Fort de Kock, 920 M., 1925, 3 ♀ ♀ (E. Jacobson).

*Dasyhelea* sp. ♂

A very small species similar to the preceding species in size

and structure, but differing in colouring, being mainly yellowish. Head, shoulders, scutellum and the area in front of it, halteres, and tip, sides, and venter of abdomen yellowish. Scutum with the usual broad bands which are dark brown but not blackish, as also are the tergites of the abdominal segments (except tip). Antennae dark brown, without stylet, much as in the preceding species but 14th. segment relatively shorter, the lengths of the last five segments in the single specimen examined being about 13, 13, 12, 11, and 17 units respectively. T. R. about 2.3.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

The insect resembles in some respects *D. tersa* (Joh.) but apparently differs in the form of the antennae, the basal segments of which are longer than broad, as in the preceding species, not transversely oval, and the last segment less than twice as long as the 14th. It is perhaps the same as *D. fulvicauda* M. a species found in the Marquesas Islands.

### *Stilobezzia* Kieff.

#### *Stilobezzia subviridis* sp. n.

A dark brown species, perhaps greenish when alive, with dark brown scutellum and halteres, and the four posterior femora dark brown, darker than the anterior pair. Wings unadorned, without macrotrichia. First tarsal segment of hind legs without a basal spine.

♂, ♀ — Length of wing, 1.7—1.8 mm., greatest breadth of wing about 0.5—0.6 mm.

Head brown or darkish brown. Eyes bare, narrowly separated above. Palpi dark brown, slender, the segments sub-cylindrical: in both sexes segments 3 and 5 sub-equal, the for-

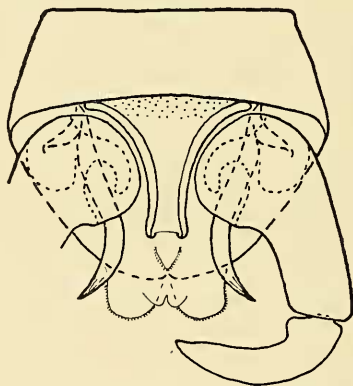


Fig. 4. *Stilobezzia subviridis* sp.n.: hypopygium, ventral view.

mer with a shallow sensory depression on anterior third, and 4 a third shorter. Mandibles of female armed with 7 strong teeth. Antenna of male dark brown, paler at tip, with a well developed dark brown plume arising from segments 3—12 : segment 3 large, in the specimen measured 36 by 11 (maximum) units, with two whorls ; 4—10 similar but successively narrower and a little more drawn out distally, from 15 by 10 to 18 by 6 units ; 11—12 more drawn out anteriorly, 20 by 6 and 24 by 6 units ; 13—15 long and slender, 61, 72, and 97 by about 4 units respectively, the last without stylet. Antenna of female very pale brown, slightly darker at tip, with cylindrical segments : segments 4—10 measuring in one specimen from 20 by 6 to 25 by 5 units ; 11—15 more elongate, 50, 50, 50, 53, and 91 by 4—5 units respectively, the last without stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 294, 154, and 184 units respectively.

*Thorax* dark or very dark brown in dried insect, with traces of green, a colour which may be more conspicuous in the living insect. Scutellum dark brown, hardly paler than the scutum ; bearing 4 bristles, but no small hairs.

*Wings* unadorned, but brownish anteriorly. Veins brownish, especially those in the radial areas near the middle of wing and first radial cell. No macrotrichia in either sex. Costa extending about threequarters the wing-length. First radial cell small, especially in male ; second large, about five times as long as first. Cross-vein and distal part of R 1 not in line. Petiole of M. much longer than cross-vein. Fork of Cu well distal to level of cross-vein in both sexes. Halteres with dark brown knobs.

*Legs* with rather variable adornment. Fore legs pale brown, but femora and extremities of tibiae a little darker and yellowish, and (in females) 4—5 tarsal segments darkish brown. Middle legs with femora, the extreme base, and sometimes apex, of tibiae, and (in females) 4—5 tarsal segments dark brown, and the rest pale, almost colourless. In one female the tibiae are entirely dark brown. This specimen is darker than the others, but otherwise apparently indistinguishable from them. Hind legs with femora, the whole or greater part of tibiae, and (in females) 4—5 tarsal segments dark brown, and the rest pale brown. The tibial adornment in the females is not uniform but appears to be composed of two dark brown bands, a narrow one at the apex, and a broad one just beyond the knee, with the intermediate parts sometimes practically the same colour, sometimes definitely paler brown. Segments normal, not swollen. Femora and tibiae unarmed. T.R. about 2.2. First tarsal segment of hind legs without a basal spine. Fifth tarsal segment in male unarmed on all legs ; in female unarmed on hind legs, armed with a pair of strong, dark spines on four anterior legs. Claws normal : in female the barb delicate and very apt to be broken off.

*Abdomen* uniformly very dark brown, with traces of a green colour which may be more apparent during life. Base in some lights with a silvery or white sheen. Spermatheca single, rather feebly chitinated, oval but tapering towards the base, the duct chitinated for only a short distance; in one specimen total length about  $105\ \mu$ , and greatest breadth about  $65\ \mu$ . Hypopygium (Fig. 4) of the usual type. Ninth sternite without bristles, not excavated in the middle line posteriorly. Ninth tergite cleft in the middle line posteriorly, bearing a pair of large, hairy processes. Side pieces with broad, hairy bases. Claspers highly chitinated, dark brown. Harpes highly chitinated, dark brown, blade-like, with pointed ends. Aedeagus of the usual form; the membrane joining it to the ninth sternite spiculate at base.

SUMATRA: Fort de Kock, 920 M., 1925 and 1926, 1 ♂, 10 ♀♀ (E. Jacobson).

This insect apparently does not resemble closely any species previously described from this part of the world.

*Stilobezzia castanea* sp. n.

A dull, chestnut-brown species, with unadorned wings, with the scutellum rather paler brown than the scutum, and the abdomen dark brown, the halteres darkish brown, and the legs almost uniformly dull brown.

♀ — Length of wing, 1.58 mm.; greatest breadth of wing, 0.58 mm.

*Head* darkish brown. Palpi darkish brown. Antennae darkish brown, the distal part somewhat darker than the base: segments 4—10 sub-cylindrical, from about 22 by 6 to 25 by 5 units; 11—14 longer, sub-equal, 43—45 by 4—5 units; the last segment about 55 units, without a stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 229, 163, and 194 units respectively.

*Thorax* almost uniformly dull chestnut-brown. Scutellum brown, paler than the scutum; bearing 4 bristles, but no small hairs.

*Wings* unadorned, brownish. Macrotrichia limited to extreme tip, a fair number in cell R 5, and a very few in cell M 1. Costa extending about five-sixths of wing length. First radial cell rhomboidal, rather large, about four times as long as broad; second large, about three times as long as first. Cross-vein and distal part of R 1 not in line. Petiole of M slightly longer than cross-vein (6:5). Fork of Cu almost at level of cross-vein. Halteres with darkish brown knobs.

*Legs* almost uniformly dull brown. Segments normal. T. R. about 2.5. First tarsal segment of hind leg without a basal spine; fifth armed with one or two pairs of spines. Claws normal.



*Abdomen* dark brown, not blackish. Spermathecae not examined.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This species, of which there is only a single specimen, a female, in the collection, resembles rather closely the New Zealand species *S. badia*, but is smaller, and differs in a few small details, e.g. in having fewer macrotrichia on the wings, and in the colour and armature of the scutellum.

*Stilobezzia notata* (de Meij).

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♂, 1 ♀ (E. Jacobson).

These insects are presumably *Ceratopogon notatus* de Meij. They conform in almost every particular excepting size with the description and figures of *S. notata* (de Meij.) var. *perspicua* Joh. The following points may however be noted. Length of wing, about 1.6 mm.; greatest breadth of wing, about 0.6 mm. The green ground colour is still visible in the male, but has completely disappeared from the female. Antennae of male pale at base, darker at apex, with plume hairs blackish at tips; segment 3 large, about 31 by 13 (maximum) units, with double whorl of hairs; 4—12 similar, with plume whorls, measuring from 17 by 12 to 20 by 7 units; 13—15 elongate, about 45, 63, and 130 by 5—6 units respectively, the last ending in an almost stylet-like process. Antennae of female darkish brown, basal portions of segments 3—10 paler than rest: segments 4—10 sub-equal, 18—19

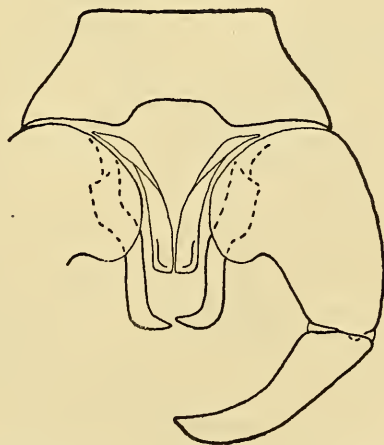


Fig. 5. *Stilobezzia notata* (de Meij.): hypopygium, ventral view.

by 6—7 units; 11—15 elongate, about 40, 41, 44, 51, and 87 by 5 units respectively, the last ending in an almost stylet-like process. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 263, 128, and 157 units respectively. Scutellum in both sexes about same colour as scutum, slightly darker in middle than at sides, bearing 2 lateral, and 2—4 centro-marginal bristles, but no small hairs. Wings without macrotrichia; with adornment and venation as described and figured by Johansen in the case of *S. notata* var. *perspicua*. Halteres with dark brown knobs. T. R. about 2.3. First tarsal segment of hind legs without a basal spine. Spermathecae two, highly chitinised, sub-equal, oval, about  $55\mu$  by  $48\mu$ , the duct chitinised not very strongly for a short distance, about  $5\text{--}6\mu$ . Hypopygium (Fig. 5) of usual type, basal portion pale, perhaps greenish in life, distal dark brown. Ninth sternite devoid of bristles, excavated in middle line posteriorly. Ninth tergite not very bristly, cleft posteriorly, with the usual hairy processes. Side pieces with broad bases, as in *S. notata* var. *perspicua*. Claspers normal, dark brown. Harpes stout, highly chitinised rods, with curved, pointed ends. Aedeagus poorly chitinised, with distal portions expanded, in some views even more than shown in the figure. Membrane joining aedeagus to ninth sternite not spiculate.

*Stilobezzia aberrans* Joh. (?)

A rather dark brown species in the dried state, resembling

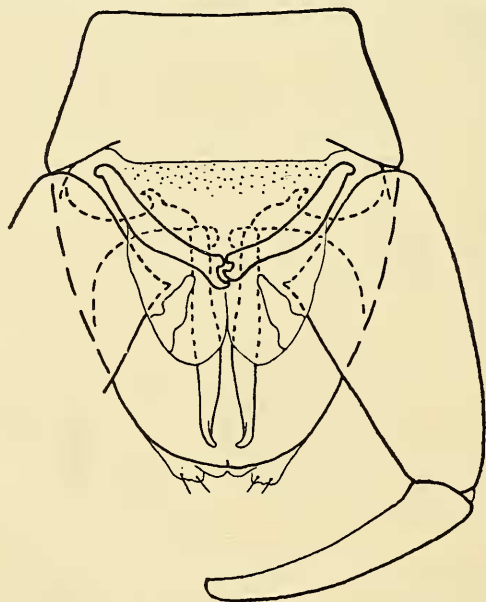


Fig. 6. *Stilobezzia aberrans* Joh.: hypopygium, ventral view.

*S. biroi* K. in most respects, but differing as indicated below.

♂ — Length of wing, 1.8 mm.; greatest breadth of wing, 0.5 mm.

*Head* very dark brown. Eyes separated above by a fairly wide line (about  $20\ \mu$ ). Palpi very dark brown, longer than proboscis; segments sub-cylindrical, the lengths of last three 25, 15, and 21 units respectively, 3 with a shallow sensory depression in anterior third. Antennae almost uniformly dark brown: segment 3 large, about 43 by 13 (maximum) units, with two whorls of hairs; 4—12 each with single whorl, 4—11 similar in form, from 18 by 12 to 23 by 8 units; 12 more drawn out anteriorly, about 36 by 5—6 units; 13—15 elongate, about 48, 63, and 108 by 5—6 units respectively, the last ending in an almost stylet-like process.

*Stilobezzia aberrans* Joh. (?)

*Thorax* rather dark brown, mottled with paler brown markings. The scutum bluntly pointed in front, as it is, according to Edwards (1932) in *S. lineata* K. also. Scutellum pale brown in middle, darker brown at sides; bearing 4 bristles, and 2 small hairs.

*Wings* with adornment as in *S. biroi*. No macrotrichia. First radial cell very small, square, almost obliterated; second long and large, about half as long as M 1. Petiole of M. about same length as cross-vein or a little shorter. Fork of Cu slightly proximal to level of cross-vein. Halteres with dark brown knobs.

*Legs* brown. On all legs femora with two indistinct dark spots, the one near base, the other a little before knee; tibiae with narrow, very dark brown band at apex, and an indistinct narrow dark band near base; and last 2—3 tarsal segments infuscated. T. R. about 2. First tarsal segment of hind legs with a strong basal spine.

*Abdomen* in dried insect a dull, rather pale, brown; the tergites with slightly darker, but indistinct markings, namely, two lateral bands with an oval spot between them. Hypopygium (Fig. 6) with dark brown markings. Ninth sternite pale, yellowish, at base, dark brown at sides posteriorly; without bristles, not excavated in middle line posteriorly. Ninth tergite sparsely bristly, cleft posteriorly. Side pieces dark brown at base and apex; rather long. Claspers yellowish; rather long and slender. Harpes dark brown, especially posterior portions, highly chitinated rods which are almost straight, but curve a little at ends, and are bluntly pointed. Aedeagus with two strong, dark brown, converging rods which are bifurcated at their inner ends, and dorsal to these. two large membranous lobes on each of which is a roughly triangular chitinated plate. Membrane joining aedeagus to ninth sternite spiculate.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♂ (E. Jacobson).

This insect is probably *S. aberrans* Joh. 1931. It should be noted, however, that there are slight apparent differences in the adornment of the legs and abdomen, and in the colour of the halteres, and that Johannsen does not describe the scutum of *S. aberrans* as being bluntly pointed anteriorly, and unfortunately omits mention of those parts of the hypopygium which are of greatest specific importance. The identification must therefore remain tentative.

The insect differs chiefly from *S. biroi* Kieffer 1918, of which only the female is known, and *S. lineata* Kieffer 1913 in the colouration of the abdomen. *S. biroi* and *S. lineata* are closely related species which Kieffer separated by the characters of the eyes and abdomen. The eyes in *S. biroi* are separated by a yellow line, in *S. lineata* they are confluent; and the abdomen in *S. biroi* is very dark brown (brun noir), with the posterior margins of the tergites white, whereas in *S. lineata* it is pale yellow, with tergites 2—6 adorned with a black median longitudinal line.

### Palpomyia Mg.

*Palpomyia calcarata* Edw., var. ?

SUMATRA : Fort de Kock, 920 M., 1925, 2 ♀♀, one damaged (E. Jacobson).

These specimens agree structurally with the description of *P. calcarata*, the type of which was a female from Luzon, P. I.; they differ however in colouring of thorax and legs both from *P. calcarata* and from the recently described *P. pendleburyi* Edw. of North Borneo.

Thorax with mesonotum and most of pleurae light reddish, unmarked; scutellum dark brown; postnotum and posterior part of pleurae black. Middle and hind tibiae extensively darkened at base. Palmi mainly yellowish. Eyes separated by about the width of two facets. Scutellum with six bristles.

*Palpomyia caesia* sp. n.

An almost black species with all the femora and the hind tibiae entirely very dark brown, but the fore and middle tibiae in part lighter brown; fore femora swollen; all femora armed with spines.

♀ — Length of wing, 3.5 mm.; greatest breadth of wing about 0.9 mm.

Head almost black. Eyes separated rather widely, by about 55  $\mu$ . Palpi dark brown. Antennae dark brown, but bases of segments, especially of segments 3—10, paler, yellowish; segments sub-cylindrical, 4—10 subequal, about 25—27 by

7—8 units; 11—15 elongate, about 69, 65, 75, 80, and 97 by 5—7 units respectively, the last without stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 386, 177, and 222 units respectively.

*Thorax* almost black, with silvery pruinescence, notably a long oval patch on each side of middle line, and three small spots external to it. Thoracic tubercle well formed, sharply pointed. Scutellum almost black; bearing 8 dark bristles.

*Wings* unadorned, but anterior margin and veins brown or brownish: without macrotrichia. Costa extending about seven-eighths length of wing. First radial cell long; second about twice as long as first. Distance between fork of M. and cross-vein slightly greater than length of cross-vein. Fork of Cu at about same level as cross-vein, slightly distal to level of fork of M. Halteres with dark brown knobs.

*Legs* with all femora and hind tibiae entirely very dark brown, almost black; fore tibiae dark brown at base, and (more narrowly) apex, paler brown between; middle tibiae with dark brown portion wider, covering nearly basal two-thirds. Tarsi rather pale brown, but last 2—3 segments and apices of others infuscated. Fore femora very much swollen, but not so much as in *P. calcarata*, armed beneath with numerous (about 25) black spines; middle and hind femora normal, each armed with 2 spines. Fore tibiae slender, curved, the tip on the flexor side projecting a little but not forming a large, black, spur as in *P. calcarata*. Tarsi with segment 4 cordiform on fore and middle legs, short but not definitely cordiform on hind legs; last segment on all legs armed with 8—9 dark, blunt-ended spines. T. R. 3. Claws on all legs equal, about half length of last tarsal segment, each with a small basal barb on inner side.

*Abdomen* almost black. No spine-like supports for ever-sible glands. Spermatheca single, highly chitinised, oval, about  $93\mu$  by  $85\mu$ ; the commencement of duct chitinised for a short distance, about  $11\mu$ .

SUMATRA: Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This insect does not appear to resemble closely any species previously described from this part of the world. According to Johansen's key it would fall nearest *P. böttcheri* Edw., from which species it differs in the adornment of the legs, in having the fore femora swollen and armed with numerous spines, as well as in several other characters. The species is in some respects not typical of the genus.

### *Sphaeromias* Curtis.

*Sphaeromias obscuripes* sp. n.



A very dark brown species, closely resembling *S. insons* Joh., but differing as indicated below.

♀ — Length of wing, 2.3 mm. ; greatest breadth of wing, 0.75 mm. Johansen's description of *S. insons* may be considered to apply also to this species excepting as indicated below ; but the general colour is darker, dark, or very dark brown rather than brown, and the following additional characters may be noted. Antennae dark brown, the segments sub-cylindrical: segments 4—10 from 12 by 9 to 18 by 7 units ; 11—15 more elongate, about 31, 32, 34, 35, and 36 by 5—6 units respectively, the last without stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 160, 104, and 126 units respectively. Thorax without anterior tubercle. Scutellum as dark as scutum ; bearing about 10 bristles. Wings pale, without macrotrichia. Costa, and second radial cell, reaching practically to wing tip. M. sessile, but fork almost at level of cross-vein. Halteres with brownish knobs. All femora and tibiae, and terminal segments of all tarsi, very dark brown. Fore femora somewhat swollen, armed beneath with about 8 spines ; middle and hind femora normal, each armed with about 4—5 spines. T. R. about 2.2. Fourth segment of tarsi not cordiform, on the four posterior legs shorter than on the fore legs ; fifth on all legs armed with two pairs of spines. Claws equal, nearly as long as fifth tarsal segment, those of fore legs each with a barb on the inner side, those of the other legs without barb. The barbs on the claws of the fore legs are unequal, one being large, one small. Abdomen very dark brown, with posterior margins of tergites narrowly white or greyish. Spermathecae two, very highly chitinised, oval but tapering towards base, rather unequal, about  $110\mu$  by  $85\mu$  and  $92\mu$  by  $67\mu$  respectively ; the commencement of duct chitinised for a short distance, about  $5\text{--}7\mu$ . No spine-like processes on anterior margins of tergites.

SUMATRA : Fort de Kock, 920 M., 1 ♀ (E. Jacobson).

### *Xenohalea* Kieff.

#### *Xenohalea polydora* sp. n.

A rather dark brown species, with the scutellum yellowish brown, the halteres with brownish knobs, and the femora and tibiae of the fore legs practically entirely dark brown.

♀ — Length of wing, 3.2 mm. ; greatest breadth of wing, 0.9 mm.

*Head* and appendages dark brown, with grey pubescence. Eyes contiguous above. Antennae dark brown, with a banded appearance due to segments 3—10 and 15 being pale brown

at base, and 11—14 pale brown at base and apex : segments 4—10 from about 20 by 8 to 28 by 7 units ; 11—15 more elongate, about 46, 48, 46, 50, and 60 by 5—7 units respectively, the last without stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 250, 159, and 191 units respectively.

*Thorax* darkish brown with grey pubescence, in some lights appearing grey, with numerous dark spots marking the bases of hairs, showing indistinctly the usual three broad bands. No anterior tubercle. Scutellum darkish yellow-brown, a little darker in middle than at sides ; bearing about 14 dark bristles.

*Wings* pale, unadorned, without macrotrichia. Costa reaching nearly to tip, more nearly than end of M 2, but not so near as end of M 1. Second radial cell very long, three and a half times as long as first. Cross-vein short, vertical. M sessile : distance from fork to cross-vein slightly greater than length of cross-vein. Fork of Cu at about same level as middle of first radial cell. Halteres pale, with brownish knobs.

*Legs* adorned : fore legs with femora and tibiae practically entirely dark brown, middle legs with apical halves of femora and basal halves of tibiae dark brown, and hind legs with apical halves of femora and basal thirds of tibiae dark brown. Tarsi all paler brown, with apices of first four segments, and whole of fifth, infuscated. Form of segments normal. Femora not especially swollen ; all armed with black spines, about 18 on fore legs, 9 on middle, and 6 on hind legs. First tarsal segment of fore legs short, about one third length of tibia. First two tarsal segments of hind legs each with single row of bulbous spines, and a single apical spine. Fourth tarsal segment on all legs short but not cordiform, on fore legs not longer than on others ; fifth armed with numerous (about 12) black spines. T. R. about 2.1. Claws on all legs unequal, the one nearly as long as the fifth tarsal segment, the other about two-thirds as long, fused at base.

*Abdomen* in dried insect very dark brown, shining, the articulations in the middle (4—7) narrowly pale brown. Spermathecae two, very highly chitinised, oval, unequal, about  $150\mu$  by  $110\mu$  and  $110\mu$  by  $90\mu$  respectively ; the duct chitinised for only a very short distance, about 4—5 $\mu$ . No gland rods.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This insect is larger than *X. pruinosa* K., the type species of the genus, and differs from it also in the adornment of the legs, and in having more numerous spines on the femora. It resembles also another Indian species, *X. polysticta* K. This

species was assigned by Kieffer first to *Palpomyia* and later to his new genus *Mixohoelea*. In the original description the fourth tarsal segment is not definitely stated to be cordiform as it is in *Mixohoelea*, but simply „un peu plus long que gros". It is possible therefore that it should be referred to *Xenohoelea*, especially as *Xenohoelea* and *Mixohoelea*, as pointed out by Edwards (1932), are probably not separable. *X. polysticta* resembles the species just described in most other respects, but apparently the tibiae of the fore and middle legs have less extensive dark brown markings.

### *Nilobezzia* Kieff.

#### *Nilobezzia conspicua* Joh.

A very dark brown or blackish species, with the fore and middle legs almost entirely brown or yellowish-brown, but the femora and tibiae of the hind legs with dark brown adornment.

♀ — Length of wing, about 3.5 mm.; greatest breadth of wing, 0.9 mm.

*Head* very dark brown, blackish. Eyes bare, separated above by a wedge-shaped area. Palpi darkish brown, segments sub-cylindrical, third without pit: lengths of last three segments in one specimen 25, 12, and 11 units respectively. Antennae very dark brown, relatively rather short: segments 4—10 oval, measuring in one specimen from 11 by 9 to 16 by 7 units; 11—15 more elongate, in same specimen 35, 39, 38, 39, and 42 by 6—8 units, the last without stylet. The combined lengths of segments 11—15, 4—10, and 3—10 approximately 193, 95, and 119 units respectively.

*Thorax* very dark brown, blackish, with some greyish pruinescence. No anterior tubercle. Scutellum almost as dark as scutum; bearing about a dozen bristles and hairs.

*Wings* slightly dusky at tip; without macrotrichia. Anal angle rectangular. Costa extending about four-fifths of wing-length, its end slightly further from tip than is end of M 2. Fork of M proximal to cross-vein; distance from fork to cross-vein slightly greater than length of cross-vein. Fork of Cu slightly distal to level of cross-vein. Halteres with white, or almost white knobs.

*Legs* mainly yellowish-brown, but femora and tibiae of hind legs largely, and last tarsal segment of all legs entirely dark brown. Fore and middle legs mainly brown or yellowishbrown, but knees a little darkened, and with traces of infuscation at bases of femora and both ends of tibiae. Hind legs with femora dark brown excepting just before knee where there is a narrow paler band; tibiae dark brown at extreme apex and over entire basal half. Tarsal segments 1—4 of all legs with infuscated apices, 5 entirely dark brown. Fe-

mora not swollen, not armed with stout spines. Spine-like bristles present on femora of middle and hind legs, and on all tibiae. T. R. about 3. Fourth tarsal segment on all legs sub-cylindrical; fifth armed with about 12 black spines. Claws on all legs equal, long, about three-quarters length of fifth tarsal segment, each with a strong basal barb.

*Abdomen* very dark brown, blackish. No gland rods. Spermathecae two, very highly chitinised, somewhat pyriform, sub-equal, about  $115\mu$  by  $75\mu$ ; the duct not chitinised. The vulval orifice has on each side an antero-posterior row of 4—5 short bristles, and external to them, a group of 5 long, strong bristles.

SUMATRA : Fort de Kock, 920 M., 1925—1926, 7 ♀ ♀ (E. Jacobson); and Tandjunggadang, 1200 M., II. 1926. 1 ♀ (E. Jacobson).

This insect is probably the same as the species described by Johansen (1931) under the name *Bezzia* (*Nilobezzia*) *raphaelis* Salm var. *conspicua* but considered by him to be perhaps a distinct species. If as is suggested below the species which follows is *N. raphaelis*, this insect must be raised to specific rank.

*Nilobezzia raphaelis* (Salm).

A very dark brown species closely resembling the preceding species but with all the femora dark brown, and differing also as indicated below.

♀ — Length of wing, 2.5 mm.; greatest breadth of wing, 0.7 mm.

The description of the preceding species may be taken as applying also to this insect, due allowance being made for the difference in the size, excepting in the following particulars. Last two segments of palpi much paler than the rest. Wings milky, not dusky at tip: microtrichia much smaller, indeed, practically invisible over the greater part of the wing surface. Wing tip less pointed, and anal angle less sharply rectangular. Legs with all femora and tibiae dark brown, but tibiae of fore and middle legs not quite so dark in the middle as at the ends. Spine-like bristles on femora of middle and hind legs more scanty, only one or two near apex. Spermathecae similar but smaller and rather unequal, about  $92\mu$  by  $70\mu$  and  $74\mu$  by  $60\mu$  respectively; the commencement of the duct chitinised for a short distance, about  $5\mu$ . The tufts of long bristles on each side of vulva smaller, composed of only 2—3 bristles.

SUMATRA : Fort de Kock, 920 M., 1925, 1 ♀ (E. Jacobson).

This insect may perhaps be regarded as the same as that described by Salm (1916) as *Ceratopogon blanchardi*, and later (1917) renamed by him *C. raphaelis* because the previous name was preoccupied. The strong bristles on the middle and hind femora which are characteristic of the genus *Nilobezzia* are not mentioned by Salm in his description, although in his figure one or two exceptionally strong bristles are shown on the hind femora at any rate. This has led Johannsen (1931) to suggest that Salm's species may be the same as Kieffer's *Parrotia nigriventris*. In the specimen described above these spine-like bristles are very scanty and might easily be overlooked. It seems likely therefore that Salm's *C. raphaelis* (1917) and Kieffer's *P. nigriventris* (1923) are the same, in which case Salm's name has priority, and that the insect is really a *Nilobezzia*. This view is adopted here.

It has been pointed out to me by Prof. O. A. Johannsen that in my report on „Some new or little-known *Ceratopogonidae*” in the Annals and Magazine of Natural History (Ser. 10, vol. 1X, p. 496) there is an obscurity regarding the armature of the femora in the genus *Nilobezzia*. In *Nilobezzia* the four posterior femora bear spine-like bristles, but not spines such as are found on the femora in the genus *Palpomyia*. Prof. Johannsen believes that Kieffer intended to differentiate between „spinules” and „dents”, the former more bristle-like, and the latter short stout spines, and to this interpretation Dr. F. W. Edwards agrees. The spine-like bristles of *Nilobezzia* are not greatly different from ordinary bristles, and intermediate forms may be observed. They may also be very few in number, as in the species just described, and in this case they would readily escape observation. For these reasons it seems doubtful if they can be regarded as a valid generic character, and the retention of the genus *Parrotia*, which differs from *Nilobezzia* apparently only in the lack of such spine-like bristles on the femora, is probably inadmissible.

### **Bezzia (Probezzia) Kieff.**

*Bezzia (Probezzia) conspersa* Joh.

SUMATRA : Fort de Kock, 920 M., 1925, 6 ♀ ♀ (E. Jacobson).

The specimens agree well with Johannsen's description of this species but are darker, the head, thorax, and scutellum being dark brown rather than dusky yellow, and the abdomen also dark brown. This difference may perhaps be explained by the fact the specimen examined by Johannsen had been preserved in alcohol. Assuming that the iden-



tification is correct, the following details may be added to those given by Johannsen to facilitate comparison with other, allied, species.

Antennal measurements in one specimen as follows : segments 4—10 sub-equal, but successively narrower, from 18 by 7 to 18 by 6 units ; 11—15 about 33, 34, 38, 43, and 43 by 5—6 units respectively, the last without stylet ; the combined lengths of 11—15, 4—10, and 3—10 about 191, 125, and 156 units respectively. Thoracic tubercle quite small. Scutellum only slightly less dark than scutum ; bearing apparently only 4 bristles. Wings dusky at tip. Halteres from almost white to darkish brown. Legs with the darkened area at apex of hind tibiae covering more than just the joint. Tarsi with last 2—3 segments darkened on the four anterior legs, and even more on the hind legs. T. R. about 2.3. Abdomen with tergites rather dark brown. Tergites 5—7 bearing long gland rods ; those on 7 dark brown and conspicuous, those on 5 and 6 almost colourless and not readily seen. Spermathecae two (and a rudiment), highly chitinised, oval, rather unequal, in the specimen measured  $63\mu$  by  $52\mu$  and  $52\mu$  by  $41\mu$  respectively ; the commencement of the duct chitinised for a short distance, about  $4-7\mu$

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